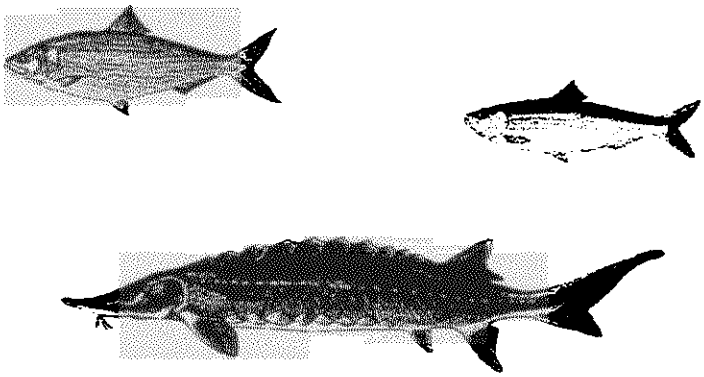
APPENDIX D

U.S. FISH AND WILDLIFE SERVICE AND NATIONAL MARINE FISHERIES SERVICE COORDINATION ACT REPORTS

FINAL FISH AND WILDLIFE COORDINATION ACT REPORT
ON
NEW SAVANNAH BLUFF LOCK AND DAM PROJECT
SECTION 216 DISPOSITION STUDY



Prepared by:
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Under the Supervision of
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Charleston, South Carolina

September, 2000

U.S. Fish and Wildlife Service
Southeast Region
Atlanta, Georgia

United States Department of the Interior

FISH AND WILDLIFE SERVICE
176 Croghan Spur Road, Suite 200
Charleston, South Carolina 29407

September 25, 2000

Colonel Joseph Schmitt
District Engineer
U.S. Army Corps of Engineers
P.O. Box 899
Savannah, GA, 31402-0889

Re: Final Fish and Wildlife Coordination Act 2(b) Report on the New Savannah Bluff Lock and Dam 216 Decommissioning Study

Dear Colonel Schmitt:

Enclosed please find one bound and one unbound copy of the above-referenced report submitted in partial fulfillment of Section 2(b) of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The report is based on the information contained in the July and August, 2000 drafts of the final Section 216 Disposition Study Report provided by Savannah District personnel.

The FWCA report supports the study's chosen alternative and concurs with the recommendation to deauthorize the project. The report further recommends exploration of other alternatives and measures if the decommissioning alternative is not chosen. These recommendations relate to mitigating fragmentation impacts including fish migration if a pool is to be maintained above the project.

The report has been reviewed and its recommendations concurred with by the other Fish and Wildlife Coordination Act agencies. The National Marine Fisheries Service, the South Carolina Department of Natural Resources have concurred with its conclusions and recommendations. The Georgia Department of Natural Resources will forward its comments directly to the Corps upon completion of their review. The document is ready to be appended to your final study report.

Sincerely yours,

Roger Banks

Roger L. Banks
Field Supervisor

RLB\SG

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EXECUTIVE SUMMARY

The purpose of this U.S. Army Corps of Engineer's (Corps) study is to examine the operation procedures and uses of the New Savannah Bluff Lock and Dam (NSBL&D) project and recommend its future disposition to Congress. The goal is to discontinue all Federal future Operation and Maintenance, Rehabilitation, Repair and Replacement costs by either recommending deauthorization to Congress or by identifying an interested non-Federal entity to sponsor all future costs. This Fish and Wildlife Coordination Act (FWCA) report describes existing fish and wildlife resources within the New Savannah Bluff Lock and Dam (NSBL&D) Savannah River study area and the future of these resources with and without the project, evaluates the selected plan and alternatives, suggests other alternatives, and identifies fish and wildlife conservation measures, opportunities and recommendations. This report is based on the alternatives described in the July 2000 and August 31, 2000 draft final study reports supplied to us for these purposes by the Savannah District Corps.

The NSBL&D facility is a major obstruction to the upstream passage of anadromous fishes, which during the early part of the nineteenth century annually migrated to the headwaters of the Savannah River, through the Tugaloo River, and up the Tallulah River to Tallulah Falls, approximately 384 river miles from the ocean. Historic spawning habitat limits have essentially been cut in half. The NSBL&D at River Mile 187.3 was constructed in 1937 for commercial navigation purposes. This solely authorized purpose is no longer valid. Construction of a series of large Corps reservoirs and other hydropower and small reservoirs has essentially eliminated riverine Piedmont habitats in the Savannah River with the exception of the Augusta shoals just above the NSBL&D project. The project impounds a portion of these shoals. Opportunities exist to provide unimpeded fish passage and restore over 15 miles of Piedmont and Sand Hills riverine habitat. Passage of native riverine fishes would improve population connectivity and the genetic health of fish populations, including the imperiled robust redhorse, (Moxostoma robustum).

The Service recommends the following actions/alternatives to reduce and eliminate the continuing impact of the NSBL& D project on fish and wildlife resources and provide for a clearer decision making process. **In order to meet the primary resource objective of reversing river fragmentation, it is important that restored or enhanced passive passage opportunities for all migratory species should be a part of any chosen alternative.**

1. Select the dam decommissioning alternative which includes removal of the dam structure to the extent that it no longer serves as a blockage to fish movement but also develop sub-alternatives which include:

- Cost reduction modifications (e.g., leaving concrete rubble in place as long as it is not a navigation hazard or fish migration barrier).

- Subsequent studies and identified remedial actions for riverine and riparian habitat restoration (e.g., sediment flushing flows, riparian plantings) above the dam.

- Subsequent studies and actions which would foster the continued high use recreational bank fishery. These should include access to the river lock wall or a replacement access facility and

mitigation of any lost angling opportunities through construction of fish attraction sites and improved bank angler access.

- Seeking Congressional funding or other innovative funding or financial incentives and partnerships to aid transitions for industrial, commercial and private interests which may be economically affected by project decommissioning. These monies should be obtained prior to or in conjunction with decommissioning to help mitigate incidental economic burdens due to the decommissioning.

- If the dam decommissioning and removal alternative is not selected or its selection is later supplanted by Congressional action or other factors, serious exploration of other alternatives suggested in this report should be undertaken. These include the instream rock weir alternative, modifications of the currently proposed fishway design and inclusion of a fishway in the transfer alternative.

- For any selected alternative other than the dam decommissioning and removal or instream rock weir alternatives, design and construct a passive fishway alternative which would provide unimpeded passage for all aquatic organisms in this area of the Savannah River. Such fishway should ideally be based on a natural bypass channel fishway design which incorporates construction of a morphologically natural stream segment around the dam site. The constructed stream should be designed to dissipate energy and provide suitable fish passage velocities by mimicking geomorphically natural features such as meander bends, and pool/riffle complexes. It should be noted that the SCDNR recommends a South Carolina side alternative with an educational facility and bank and boat angler access. Based on review of the site, it appears that if the navigation lock remains functional, a South Carolina side fishway may be the only effective location to attract fish into the fishway.

- For any selected alternative other than the dam decommissioning and removal or instream rock weir alternatives, include fish passage enhancements in the lock rehabilitation plans. These consist of a new side entrance slot close to the dam and a crowder device to help fish exit the lock chamber.

- Provide additional studies on project economics which include the positive benefits of dam decommissioning to anadromous fish stocks and consequently long term recreational and potential commercial fishing benefits, river and shoal habitat restoration and restoration of native fisheries and unique plants such as the robust redhorse and rocky shoals spider lily. Such information will require economic studies utilizing contingent valuation methods. The inclusion of such information will better balance the economics of the decommissioning alternative to which the study currently attributes no economic benefits.

- Provide studies and simulations demonstrating the anticipated post-sediment flushed river channel morphology above the NSBL&D. While we anticipate the return of aesthetic riverine conditions for the current backwater area, the modeling and simulation of these conditions should provide a higher degree of aesthetic comfort level to those interests concerned with this element of the project.

NEW SAVANNAH BLUFF LOCK AND DAM PROJECT 216 STUDY

INTRODUCTION

AUTHORITY

This study is being conducted under the authority of Section 216 of the Flood Control Act of 1970 (Public Law 91-611) which authorizes the Corps of Engineers to review the operation of Corps constructed projects when significantly changed physical or economic conditions warrant and to report to Congress ". . . *with recommendations on the advisability of modifying the structures or their operation, and for improving the quality of the environment in the overall public interest.*" The Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) (FWCA) authorizes the U.S. Fish and Wildlife Service's (Service) involvement in this study. The Service prepared this report with funds transferred from the Corps under the National Letter of Agreement between our agencies for funding of FWCA activities.

PURPOSE AND SCOPE

The purpose of the Corps' study is to examine the operation procedures and uses of the New Savannah Bluff Lock and Dam (NSBL&D) project and recommend its future disposition to Congress. The goal is to discontinue all Federal future Operation and Maintenance, Rehabilitation, Repair and Replacement costs by either recommending deauthorization to Congress or by identifying an interested non-Federal entity to sponsor all future costs. This final FWCA report describes existing fish and wildlife resources within the NSBL&D Savannah River study area, the future of these resources with and without the project, evaluates the selected plan and alternatives, suggests other alternatives and identifies fish and wildlife conservation measures, opportunities and recommendations.

PRIOR STUDIES AND REPORTS

The Service provided a draft FWCA report for this project in November of 1999 and has been corresponding with the Savannah District relative to fish passage problems at the NSBL&D project since the early 1980's. In July, 1985, the Service prepared a Reconnaissance Planning Aid Report for the Savannah River Basin Study which identified the Augusta Shoals area as a "unique aquatic area", addressed anadromous fish issues in the Savannah River including blockage by NSBL&D, and included recommendations to enhance fish passage at NSBL&D. In February, 1996, the Service prepared an FWCA report on the Lower Savannah River Basin Study which primarily addressed environmental enhancements to the Savannah River below the NSBL&D.

The following report has been coordinated with the National Marine Fisheries Service (NMFS), the South Carolina Department of Natural Resources (SCDNR) and the Georgia Department of Natural Resources (GDNR). We have received concurrence with the recommendations contained in this report (see Appendix A for agency letters) from the NMFS and the SCDNR. The NMFS has requested that the recommendations in this report be considered as joint recommendations of the Service and the NMFS. The GDNR will forward its comments directly to the Corps upon completion of their review.

DESCRIPTION OF THE STUDY AREA

GENERAL DESCRIPTION

The Savannah River is a major interstate river with a drainage basin of over 10,000 square miles and forms the border between the States of Georgia and South Carolina. The upper natural river system has been fragmented by a series of reservoirs. The NSBL&D project is the lowest dam on the Savannah at River Mile 187.3, approximately 13 river miles downstream from the city of Augusta in Richmond County, Georgia and the city of North Augusta in Aiken County, South Carolina.

The NSBL&D project is physically located just below the fall line in the Sand Hills Region of the of the Savannah River Watershed between the Piedmont and Upper Coastal Plain Provinces. The project affects a river reach upstream which extends above the fall line into the Piedmont Province. The Sand Hills Region is a belt of deep sandy soils on gently sloping to strongly sloping uplands. Soils in this area were derived from marine sands, loams, and clays that were deposited on acid crystalline and metamorphic rocks. Elevation ranges from 350 to 500 feet M.S.L. (Smith and Hallbick 1979, Perkins and Shaffer, 1977). The Piedmont Province consists of gently rolling to hilly slopes. This area is underlain by acid crystalline and metamorphic rock of Pre-Cambrian origin. Elevations range from 600 to 1200 feet M.S.L. (Smith and Hallbick 1979, Perkins and Shaffer, 1977). As the river transitions from the Sand Hills to the Piedmont, substrate and structure change from sandy to bedrock and cobble/gravel shoals.

Land uses surrounding the project area include recreational and commercial developments on the Georgia side and primarily agricultural uses on the South Carolina side. In its natural state, much of the area surrounding the project was forested floodplain. The City of Augusta on the Georgia side is protected with a levee.

The Piedmont area of the Savannah River and adjacent tributary streams has been converted to a series of large reservoirs (Lakes Hartwell, Richard B. Russell and Strom Thurmond or Clarks Hill). (Figure 1). These Corps of Engineers reservoirs are managed for hydroelectric power generation, flood control, recreation, fishing, and largely control all flows in the Savannah River below them including the project area. As a result of this regulation, the magnitude of historic

high and low flows has been tempered. The effects of hydropeaking operations, are somewhat moderated by re-regulation at the Stevens Creek project, a small hydropower operation above NSBL&D. However, seasonal hypolimnetic releases and pulsing from hydropeaking operations affect the quality of aquatic habitat above the NSBL&D.

EXISTING NSBL&D PROJECT

The NSBL&D project was authorized by the 1922 Rivers and Harbors Act for commercial navigation purposes and was completed in 1937. The current project consists of a 360 foot long dam, an operation building, a 50 acre park and recreation area, and a 56 foot wide by 360 foot long by 15 foot high lock chamber located on the Georgia side of the river. The dam contains five vertical lift gates which are 15 feet high and 60 feet long and are remotely controlled from the upstream J. Strom Thurmond Dam project. The two end gates are overflow gates with elevations three feet lower than the three non-overflow gates.

The only authorized purpose of the NSBL&D project is to provide for commercial navigation. However, the last time it was used for these purposes was in 1978, more than two decades ago. Current project use relates primarily to uses that have been fostered by the flat water pool above the dam. These include water withdrawal and recreational uses.

WATER QUALITY

The project area supports a "Freshwaters" classification by the South Carolina Department of Health and Environmental Control (SCDHEC 1998). This designation is defined as:

> "*freshwaters suitable for primary and secondary contact recreation and as a source for drinking water supply after conventional treatment in accordance with the requirements of the Department. Suitable for fishing and the survival and propagation of a balanced indigenous aquatic community of fauna and flora. Suitable also for industrial and agricultural uses*".

The Georgia Environmental Protection Division of the Georgia Department of Natural Resources has classified the project area as "Fishing" waters (GDNR 1995).

There are no known significant water quality problems in the immediate project vicinity. Seasonal dissolved oxygen sags caused by hypolimnetic release from the J. Strom Thurmond project are ameliorated by reoxygenation in the Augusta shoals below the Augusta Diversion Dam some twenty miles upstream of the NSBL&D.

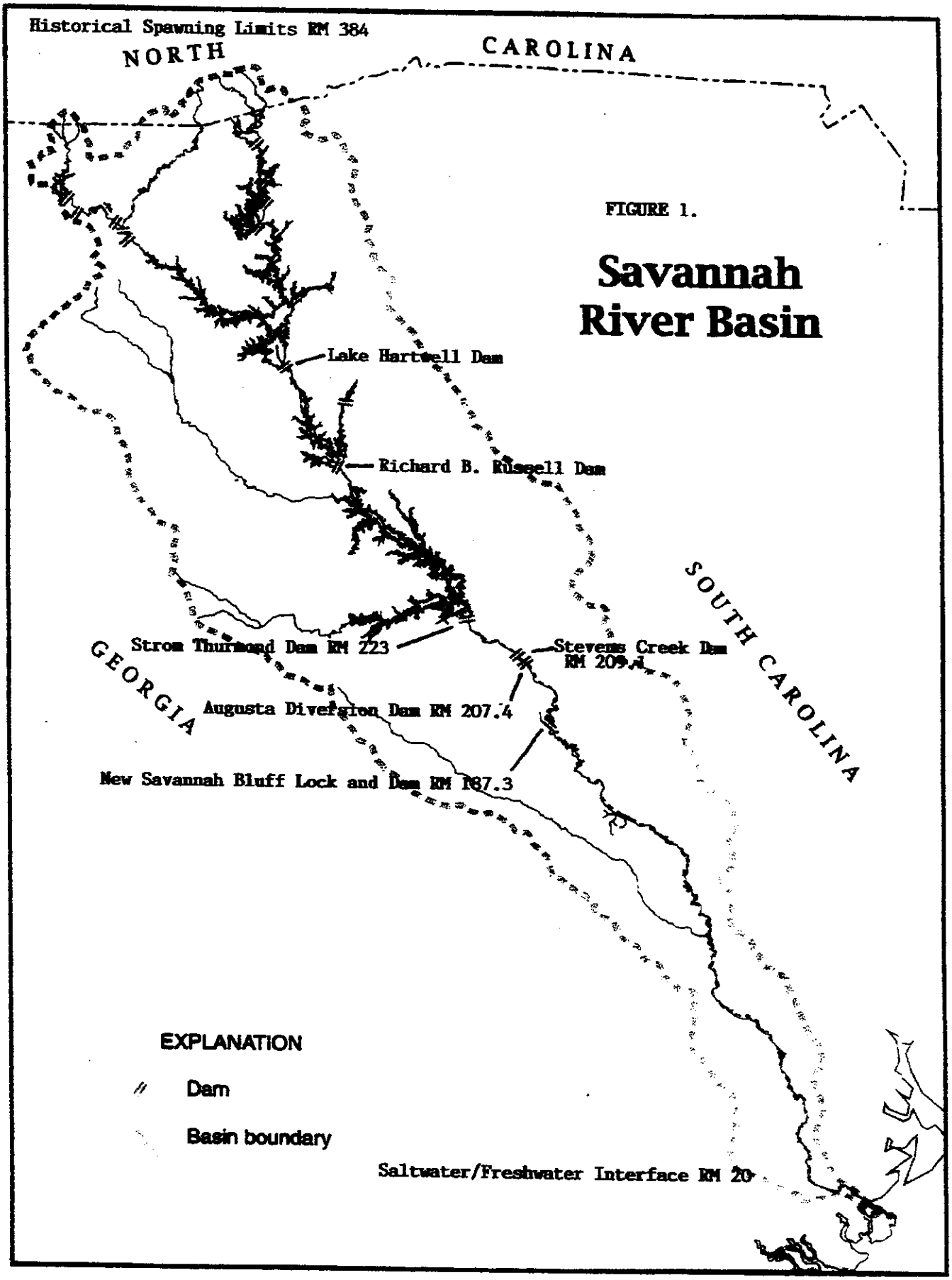


Figure 1. Savannah River Basin

EXISTING FISH AND WILDLIFE RESOURCES

FISH

A comprehensive five year fishery survey concluded that the Savannah River supports an abundant, diversified fish community (Schmitt and Hornsby 1985). Based on number and weight collected, the most abundant game fish were largemouth bass, chain pickerel, black crappie, yellow perch, redbreast sunfish, bluegill, redear sunfish, warmouth, flier and pumpinkseed Important non-game fish include longnose gar, bowfin, white catfish, channel catfish, common carp, spotted sucker, silver redhorse, striped mullet, and brown bullhead. The most important forage fish are gizzard shad and a number of minnow species. Anadromous fish found in the project area include striped bass, American shad, hickory shad, blueback herring, shortnose sturgeon and Atlantic sturgeon. The catadromous American eel also migrates through the project area. Recent surveys have revealed the presence of the imperiled robust redhorse (*Moxostoma robustum*) above and below the NSBL&D.

A recent creel survey conducted by the SCDNR from February 1 through June 30, 1999 (Boltin 1999) indicates that a variety of fish are recreationally harvested from the project area (Table 1). The value of the recreational fishery estimated by the creel was over $897,000 annually. This included trip costs, consumer surplus (willingness to pay) and durable goods expenses.

The NSBL&D presents a 15 foot impasse to upstream migration of anadromous fish such as American shad, blueback herring, and shortnose and Atlantic sturgeon when river flows are less that 16,000 cubic feet per second (cfs). Above these flows, with the dam gates fully raised, water surface elevations above and below the dam equalize sufficiently that fish may swim through the dam thus eliminating the barrier. This appears to work well for surface oriented fish such as shad. It is unknown as to whether passage opportunities for bottom oriented species such as sturgeon are afforded during these "passage flows". Beginning in 1986, through cooperative efforts between the U.S. Fish and Wildlife Service, The Corps of Engineers, the States of Georgia and South Carolina, and the City of Augusta, a passage regimen was developed utilizing the navigation lock on the Georgia side of the project.

The current lease agreement between the Corps of Engineers and the City of Augusta provides between 30 and 50 annual lock cycles between March 15 and June 15 for fish passage. Between 1996 and 1998, while the lock was non-operational, the Corps of Engineers agreed to release available water from upstream storage reservoirs to effect a passage equalization scenario at the dam (where headwaters and tailwaters equalization facilitated passage through the dam with the gates raised). While both methods have been shown to pass fish, the effectiveness of either passage alternative (i.e. the number of fish passed relative to the number at the dam) is unknown. Observations based on fishing success below the dam indicate that opening the gates during high flows may episodically pass significantly more shad than lock operations. However, such passage is limited to high flow periods which do not occur frequently during the mid to late fish passage season.

TABLE 1. Estimate of total number (N), weight (lbs) (WT), and associated percentages (%) of fish species harvested from New Savannah Bluff Lock and Dam during the 1999 access creel. (February through June, 1999).

Species	N	%	WT	%
American eel	15.9	0.1	6.9	0.1
American shad	3,827.7	31.2	8,645.2	75.8
Blue catfish	615.6	5.0	412.9	3.6
Bowfin	15.9	0.1	8.4	0.1
Black bullhead	15.9	0.1	1.3	0.0
Black crappie	242.0	2.0	109.5	1.0
Bluegill	1,240.2	10.1	101.0	0.9
Blueback herring	95.2	0.8	19.1	0.2
Brown bullhead	39.0	0.3	14.1	0.1
Channel catfish	302.9	2.5	353.1	3.1
Chain pickerel	22.7	0.2	14.0	0.1
Flathead catfish	14.3	0.1	33.8	0.3
Gizzard shad	49.6	0.4	9.6	0.1
Hybrid striped bass	28.6	0.2	21.4	0.2
Largemouth bass	71.9	0.6	16.1	0.1
Quillback	15.9	0.1	17.8	0.2
Redbreast sunfish	2,282.0	18.6	312.7	2.7
Redear sunfish	429.1	3.5	70.0	0.6

Source: Boltin 1999

Passage utilizing the lock could be greatly enhanced by creating a new side entrance closer to the dam and building a crowder device to enhance fish leaving the lock chamber.

WILDLIFE

Lands in the immediate vicinity of the dam have been converted to agricultural and recreational uses and do not support natural forested communities. Upstream of the dam, many forested areas remain adjacent to the river. These support mixed hardwood communities including white oak, black oak, willow oak, sweetgum, pignut hickory, tulip poplar, sycamore, red mulberry and pines. In the vicinity of the project, wetlands are somewhat limited to a narrow fringe along the river's edge and bordering islands in the river.

Wildlife species in the vicinity include whitetailed deer, wild turkey, raccoon, beaver, mink and muskrat. Forested areas are used by a variety of neotropical migrant songbirds, reptiles and amphibians. Waterfowl and wading birds make use of forested wetland areas, while raptor species such as red-tailed and red-shouldered hawks utilize a variety of habitats in the project area.

ENDANGERED SPECIES

A list of all listed species and species of concern accompanied the Draft 2(b) report. We have reviewed the information on threatened and endangered species and species of concern provided in Enclosure B of the December, 1999 Draft Section 216 Study Report. Based on the information contained therein and selection of the preferred alternative, we can concur with your "not likely to adversely affect" determination for those species under the purview of the Service. For a determination on the shortnose sturgeon, please contact the NMFS Protected Resources Division. The appropriate contact for matters pertaining to shortnose sturgeon is Mr. Charles Oravetz. He may be reached at by telephone at (813) 570-5312.

The primary species of concern which could be affected by the project are the listed shortnose sturgeon, the rocky shoals spider lily (*Hymenocallis coronaria*) and the robust redhorse (*Moxostoma robustum*). These species should benefit from dam removal and river restoration features of the selected alternative. However, an analysis under both Sections 7 (a)(1) and 7 (a)(2) of the ESA on the effects of the alternatives on the shortnose sturgeon, coordinated through the endangered species office of the NMFS, would be prudent. Should the selected alternative change or an alternate plan be selected, reinitiation of consultation will be necessary.

FISH AND WILDLIFE RESOURCE CONCERNS AND PLANNING OBJECTIVES

MIGRATORY FISH

Anadromous fishes are an important component of the commercial and sport fisheries of South Carolina and Georgia. Striped bass, American shad, hickory shad, blueback herring and the

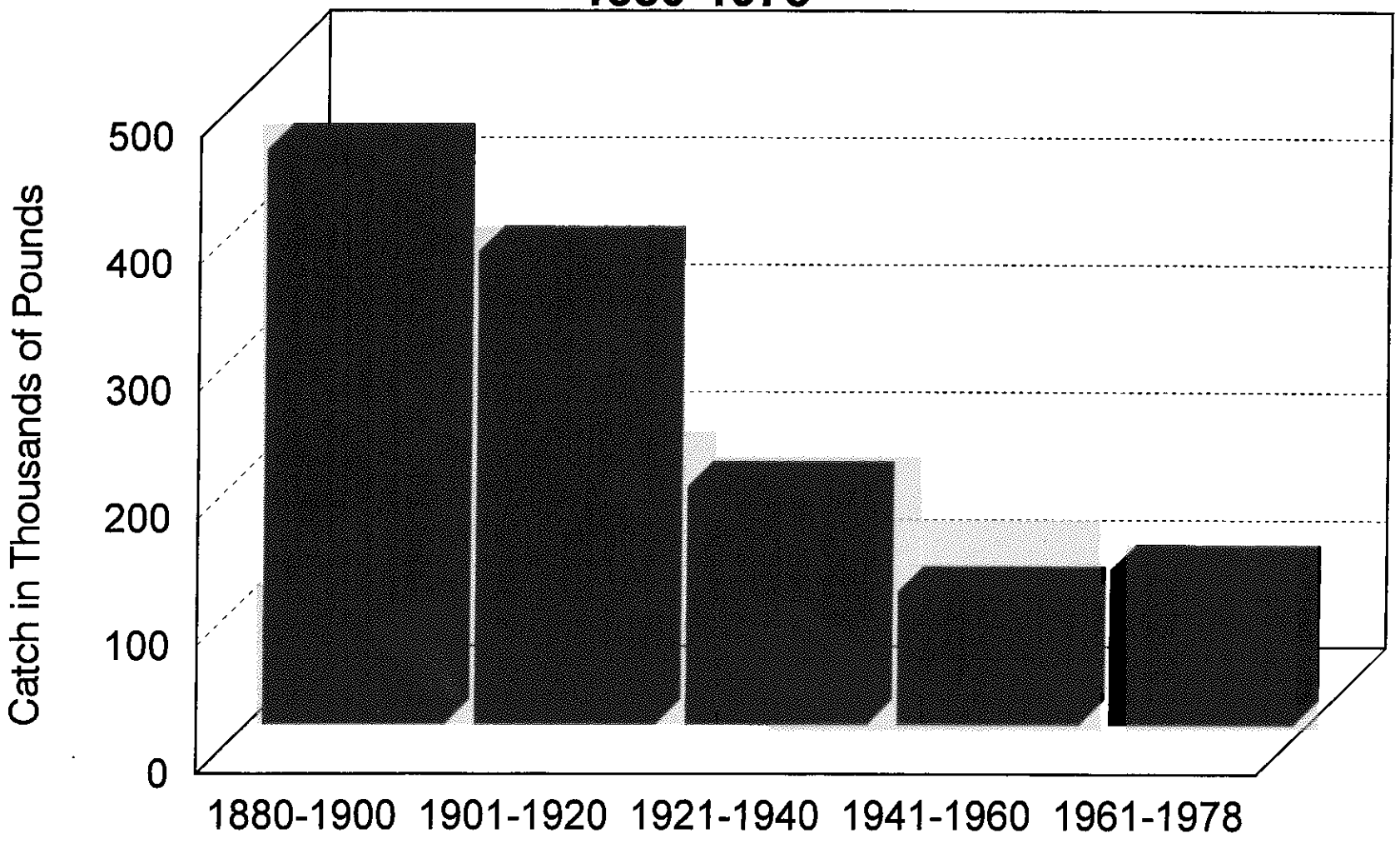
Atlantic and endangered shortnose sturgeon annually migrate to spawning and nursery grounds in the Savannah River. Historically, some anadromous species annually migrated to the headwaters of the Savannah River, through the 49-mile long Tugaloo River to Tallulah Falls, Georgia, located on the Tallulah River about 10 miles upstream of the convergence of the Tallulah and Chattooga Rivers (Stevenson 1899, as cited by Mansueti and Kolb, 1953). Today the NSBL&D, located at River Mile (RM) 187.3, represents the first major obstruction to upstream migrants and limits movement to upstream spawning and nursery grounds. Still, some migrants do pass this facility to reach spawning areas below the next upstream dam, the Augusta Diversion Dam which is located approximately 20 miles upstream of the NSBL&D. Beginning at approximately RM 223, a series of Corps dams, (Strom Thurmond, Richard B. Russell, and Hartwell Dams) impound a significant portion of the Savannah River's Piedmont area..

Dam and reservoir construction has converted or blocked access to approximately one half of the historical anadromous fish spawning and nursery habitat of the Savannah River. This may be even more significant than indicated in that the half no longer accessible was probably the most highly utilized habitat, especially for the American shad. Water pollution has resulted in additional loss and degradation of these valuable spawning and nursery grounds. Major declines in commercial landings of all Atlantic coast anadromous species have occurred since their peak in the late 1800's, with some fisheries virtually collapsing.

By the early 1950's, there were practically no shad in the Savannah River. Extensive shad fisheries in the 19th century, used drift and staked gill nets, pound nets, haul seines, weirs, fyke nets, bow nets, and dip nets. The estimated U.S. Atlantic coast catch in 1896 was 50 million pounds. Between 1930 and 1960, the average annual catch dropped to about 10 million pounds. In 1983, landings were about 3.5 million pounds. Figure 2 shows that South Carolina and Georgia landings followed this same national trend. Figure 3 provides a more detailed look at shad catch statistics in Georgia. However, it is difficult to separate out fishing effort from actual stock fluctuation. For example, the big jump which culminates in 1908 is probably associated with an activated economy which was part of the State's rapid pre-World War I growth. Industrial growth in the Savannah and the associated pollution of the river may be related to the consistently low depression era numbers.

More recent data is presented in Figure 4. The South Carolina creel data shows a general small decline in recent years. However, the data is from a very small sampling effort, sometimes as low as one or two fishermen (Billy McCord, personal communication). The Georgia landings data has
a broader sampling base, all from wholesalers. The reliability of the data is still somewhat questionable, but it does mirror the South Carolina data, showing a small decline in recent years. Based on this data and conversations with South Carolina and Georgia Department of Natural Resources biologists, shad stocks appear to be relatively stable, perhaps slightly declining, but are very depressed relative to historic levels. This reduction from historic levels is inferred from declining trends in Savannah River commercial landings in the Atlantic States Marine Fisheries Commission shad and river herring plan (ASMFC 1998). Fishing mortality does not appear to be a problem or limiting factor. It is estimated at 20 to 30 percent, way below the problem threshold for stock recovery.

Figure 2. AVERAGE AMERICAN SHAD LANDINGS IN SOUTH CAROLINA AND GEORGIA IN TWENTY YEAR BLOCKS FROM 1880-1978



Number of years of data: 1880-1900, n=6; 1901-1920, n=3; 1921-1940, n=13; 1941-1960, n=12; 1961-1978, n=18

Figure 3. HISTORICAL ANNUAL CATCH STATISTICS OF SHAD IN GEORGIA

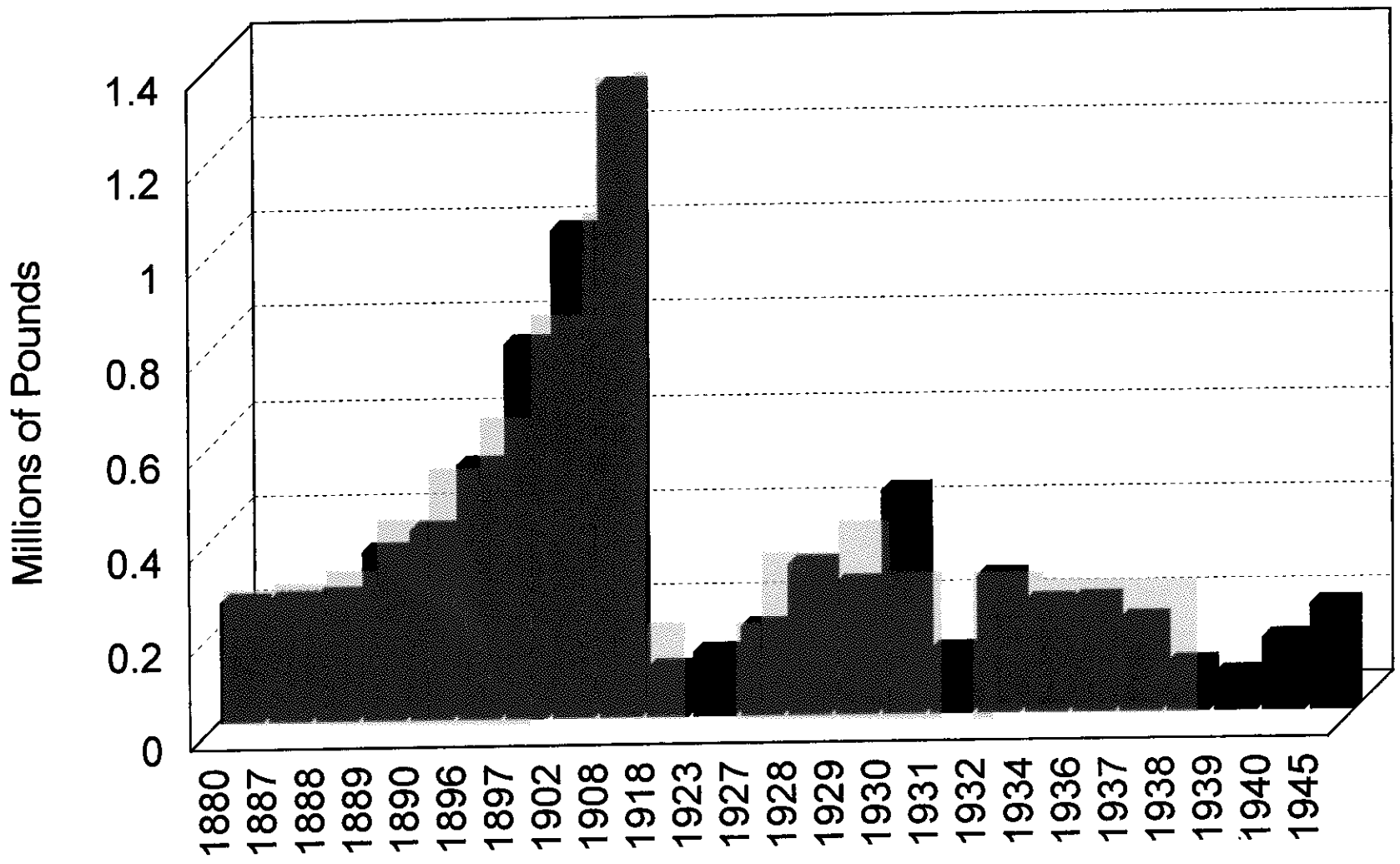
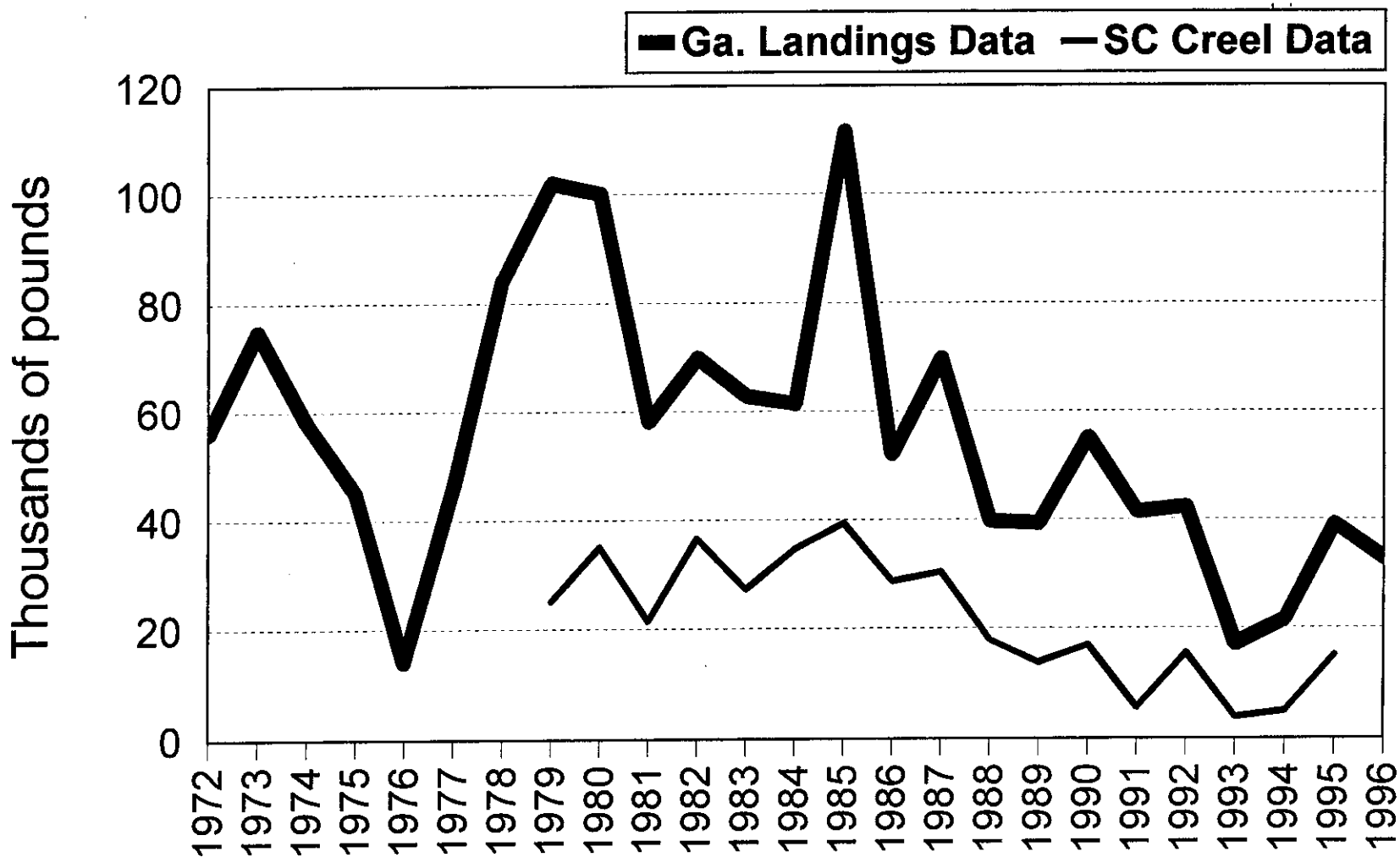


Figure 4. SHAD LANDINGS IN THE SAVANNAH RIVER



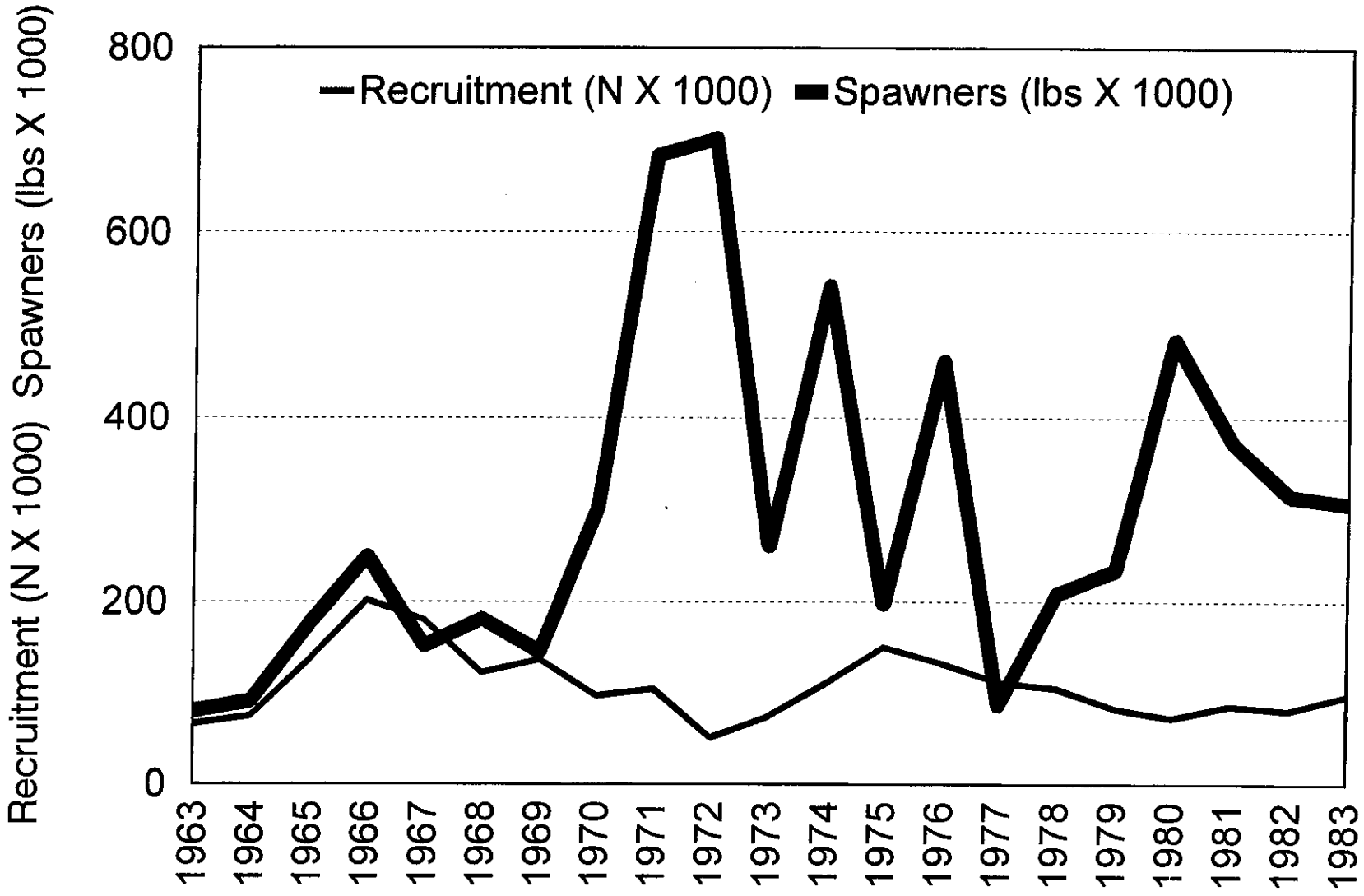
The data in Figure 5 indicates that there may be an uncoupling between spawning population numbers and recruitment success for shad in the Savannah River although the document from which the data was derived had very limited data from which to base conclusions on the Savannah River. If we assume some accuracy to the data, the limiting factor for successful recruitment in this system may be survival of early larval/juvenile stages. To enhance this stage of the life cycle, it would be ecologically prudent to space out the reproductive effort both temporally and spatially. Shad are serial spawners, and temporal and spatial distribution of reproductive energies is the crux of their evolutionary reproductive strategy. The fragmentation of the Savannah River by dams has thwarted this strategy by reducing spatial and temporal opportunities for spawning and recruitment.

Similar abundance decreases are apparent in other anadromous stocks. Striped bass populations have declined in more than 50 percent of the river systems surveyed from South Carolina to Florida. Recorded landings of Atlantic sturgeon in South Carolina peaked at 219,200 kilograms (kg) in 1897; five years later, only 42,600 kg were reported landed. South Carolina and North Carolina have reported the bulk of all east coast Atlantic sturgeon landings since the turn of the century; in 1976, these two states accounted for 84 percent (60,800 kg) of the total landings from Maine to Louisiana.

A recent status review of the Atlantic Sturgeon (NMFS/FWS, 1998) in response to a listing request under the Endangered Species Act, endorses habitat improvement measures to accelerate rebuilding of stocks. While fishing restrictions have been in effect since 1985 (South Carolina), southeast regional landings data effectively demonstrates the decline of these stocks (Figure 6). The document specifically cites the NSBL&D as denying Atlantic sturgeon to seven percent of historically available habitat.

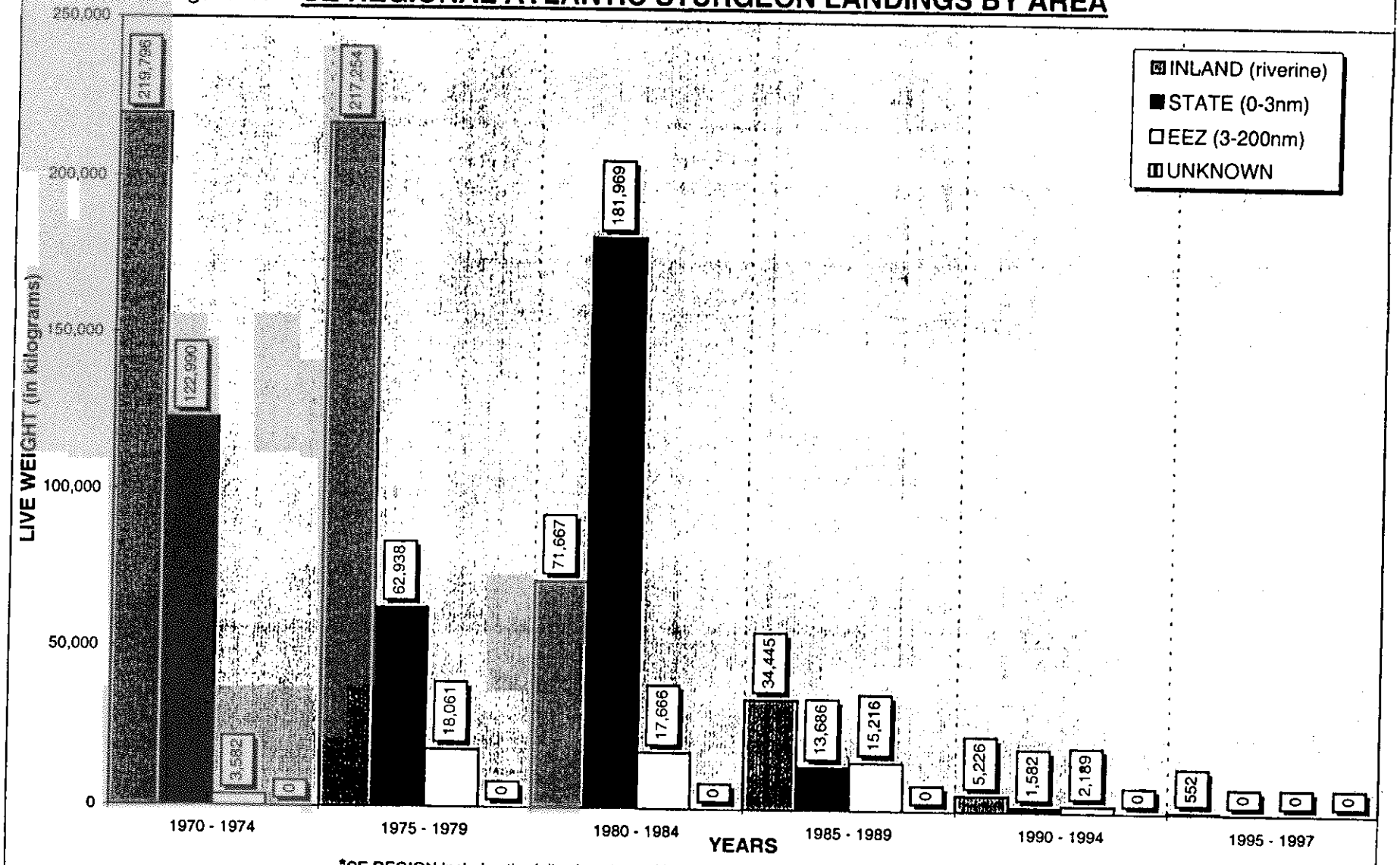
The catadromous American eel (*Anguilla rostrata*) is also present in the Savannah River, although little is known about its abundance relative to historic levels. Recent apparent declines in eel abundance have triggered management concerns on the part of fisheries managers. A recent report by the Electric Power Research Institute (EPRI, 1999), reports that upstream passage of migratory elvers at dams may be cost-effective and feasible. Downstream passage of adults .
through turbines may be more of a problem. Since no hydropower facilities exist at the NSBL&D project, downstream passage of adult eels is not projected to be a current problem. We do not have sufficient information to speculate on the efficiency of upstream passage of elvers at NSBL&D.

Figure 5. SAVANNAH RIVER SHAD RECRUITMENT 1962-1983



FROM: Stock Assessment of Am. Shad From Selected Atlantic Coastal Rivers, ASMFC Spec. Rpt 15, 1988

Figure 6. **SE REGIONAL ATLANTIC STURGEON LANDINGS BY AREA**



*SE REGION includes the following states: North Carolina, South Carolina, Georgia, and the Florida east coast.

ROBUST REDHORSE

The robust redhorse, (Moxostoma robustum), is the largest and rarest redhorse sucker in the Southeast. A single remnant population was discovered in 1991 by GDNR fisheries biologists along a 60 mile reach of the Oconee River, Georgia. An additional population of unknown size was discovered in the Savannah River in 1998 during extensive electrofishing surveys. The conservation of the imperiled robust redhorse, is being managed through the Robust Redhorse Conservation Committee (RRCC). The RRCC uses a cooperative approach to species conservation involving stakeholder partnerships and an interdisciplinary approach to species conservation which utilizes a broad spectrum of experience, expertise and management authorities. The RRCC consists of state and federal agencies including the Service and the Savannah District Corps of Engineers, private interests, and conservation organizations with the common purpose of improving the status of the robust redhorse to prevent the need to list the species as federally threatened or endangered. The robust redhorse is currently listed as endangered by the state of Georgia. The RRCC has developed a Conservation Strategy for the robust redhorse which establishes long term goals for the recovery of the species, including the establishment of three naturally reproducing populations within the species former range, and improving essential habitats.

A single robust redhorse was identified from the Pee Dee River in 1987 and one individual was collected from the Savannah River in 1989. The fish were not correctly identified as robust redhorse until the discovery of the Oconee River population. Biologists familiar with the robust redhorse captured a single female during standardized electrofishing below NSBL&D in 1997. A subsequent cooperative search of the Augusta Shoals area using six electrofishing boats captured four female robust redhorse in June of 1998. A similar effort in May of 1999 captured 23 robust redhorse from the Savannah River near the Augusta Shoals area, including five individuals immediately below NSBL&D. Eggs were collected from two females and sent to GDNR's Mcduffie Fish Hatchery and the Service's Warm Springs Fish Technology Center. All fish were tagged and future mark/recapture data will help develop a population estimate for the Savannah River.

New sampling efforts for the robust redhorse in the vicinity of the project took place in the Spring of 2000. A June 5-6, 2000 electrofishing effort collected eight fish from the middle portion of the Augusta Shoals. On May 31, 2000 a large spawning aggregation of *M. robustum* was observed on a mid-channel gravel bar a distance below the NSBL&D (Bud Freeman, personal communication).

The robust redhorse requires clean gravel substrates and stable river flows to successfully spawn. The gravel bar habitats essential to the robust redhorse exist near and below the fall line and are associated with the presence of shoals. The presence of robust redhorse above and below the dam indicates that the species may be permanently separated by the presence of the dam and that access to essential spawning habitats may be severely impaired. The NSBL&D also impounds a significant portion of riverine habitat that could provide suitable spawning habitat for the robust redhorse, including essential rearing habitats for juvenile fish.

The redhorse is a highly migratory species. Restoration of a significant portion of the Savannah River would provide access to significant upstream spawning habitats to fish currently isolated to downstream reaches. The decommissioning alternative may also increase available spawning and rearing habitats and add significantly to the pre-listing recovery efforts of the RRCC by reducing the threats from habitat losses and further reducing the potential need to list the species as federally threatened or endangered. Furthermore, the robust redhorse may be an indicator of native shoal species which have experienced significant habitat declines in the Savannah due to loss of almost all Piedmont riverine habitats.

RIVERINE HABITAT

Important fish and wildlife resource opportunities in the project area of the Savannah River are not confined to anadromous fisheries. Upstream of the NSBL&D is an area known as the Augusta shoals, one of a limited number of rocky shoals that remain not only in the Savannah River but in all of South Carolina's major Piedmont rivers. According to the South Carolina Heritage Trust Advisory Board, "rocky shoals are unique biogeomorphic features that are worthy of protection in and of themselves." These habitats are given equivalent status with wetlands as special aquatic sites in the regulations implementing Section 404 of the Clean Water Act.

The Savannah River has cumulatively lost a significant portion of its Piedmont riverine habitat. Above the NSBL&D, a series of dams impounds the river (Figure 1). With the exception of short riverine segments, the Savannah is essentially impounded by large Corps of Engineers reservoirs and small hydropower projects and other small reservoirs from River Mile 207.4 to its headwaters. Restoration of approximately 15.7 miles of riverine habitat, a portion of which is part of the Augusta shoals, would be a cumulatively significant environmental restoration benefit of project decommissioning.

RECREATIONAL FISHING

A high use recreational fishery currently exists at the NSBL&D primarily for American shad, redbreast sunfish and bluegill. Boltin (1999) estimated 126,666 hours of fishing effort in this area from February through June of 1999. Bank anglers alone spent 54,486 hours fishing in the tailwater area of the project. This document also reported that direct consumer costs (trip expenditures) incurred while fishing at NSBL&D during the February through June 1999 time period totaled $423,305.07. The report also indicted that consumers surplus, or willingness to pay equaled $391,730.83 over the survey period. It was also estimated that anglers spent $82,408.78 on fishing related equipment during the survey period. The total value of the recreational fishery estimated by the creel was over $897,000 for the five month period. While a portion of this fishery relates to the "stacking" of American shad trying to pass upstream, we do not anticipate a major change in fishing opportunity, especially in the redbreast and bluegill fishery provided that bank access is not altered. While shad passage is expected to be facilitated by project decommissioning, these fish are still expected to pass by the project site and provide fishing opportunities. Bank and small boat fishing opportunities are expected to increase

upstream as more fish traverse the upstream shoals. Such opportunities should be explored in the event that anadromous fishing opportunities at the NSBL&D decrease.

ROCKY SHOALS SPIDER LILY

The rocky shoals spider lily (*Hymenocallis coronaria*) is a bulbose, emergent perennial plant that grows on rocky shoals in Piedmont streams and rivers at and above the Fall line. Ideal conditions appear to be flowing water with high dissolved oxygen content, little or no sedimentation, with the bulbs and at least the lower portion of the leaves submersed at all times. Plants usually occur as assemblages or clumps of several to as many as 150 bulbs, or more (Aulbach-Smith 1998).

This rare spider lily is a Federal Species of Management Concern and is known from fewer than twelve total populations in South Carolina, Georgia and Alabama. The Augusta shoals has historical significance as this was the location from which this species was originally described by John Bartram. *Hymenocallis* depends on swiftly flowing water of a certain depth for its existence. A flow regime that mimics a natural high flows in late winter and spring with flows lessening in time for plant emergence in April and flowering in May and June appears to be beneficial to the plant (Aulbach-Smith 1998). The plant becomes established in relatively shallow areas, i.e., less than 6 inches of water, during low flows in the summer months (Hearn, 1995). However, some flow over the bulbs should always be maintained, especially during times of temperature extremes in the late summer and winter. Ideal water level should range from 1 to 1.5 feet over the bulb. The plants also require relatively high dissolved oxygen levels to produce healthy, vigorous plants (Aulbach-Smith 1998).

The NSBL&D is thought to have backed water over a portion of the Augusta shoals and hence habitat for this species. Alternatives which result in restoring riverine habitat are likely to result in restoring additional potential habitat for this species. Modification of flow regimes through the Augusta Shoals and improvement in dissolved oxygen condition may also be necessary for effective recovery efforts. Re-establishing riverine shoal conditions above NSBL&D could facilitate experimental planting efforts for this species. Establishment of this species in the shoals above the NSBL&D would result in unique and enhanced aesthetics.

WILDLIFE HABITATS AND WETLANDS

Former floodplain wetlands and forested riparian zones which have been eliminated in the reservoir pool which is flooded by the backwater effects of the dam represent a continuing impact of the project. There is a good potential to restore these habitats if a decommissioning and riverine restoration alternative is chosen. While other wetlands created by backwater effects may decrease in size and hydroperiod, the net effect should be creation of a more natural floodplain wetland situation with no significant wetland acreage losses.

PLANNING OBJECTIVES

The following planning objectives were developed considering the above resource concerns.

1. Provide unimpeded passage of migratory and riverine fishes to reverse river fragmentation.

Anadromous species have been blocked from significant lengths of historic spawning habitats in the Savannah River. A preliminary management plan for anadromous fish on the Savannah River was reached through elements of interagency consensus in 1992. Involved agencies included the Service, GDNR and SCDNR. Among other actions, this plan supported unrestricted passage to the base of the Strom Thurmond dam, restoring access to 35.7 miles of historic spawning habitat. The plan has been accepted by the Federal Energy Regulatory Commission as a Comprehensive Plan under Section 10(a)(2) of the Federal Power Act. **Restored or enhanced passive passage opportunities for all migratory species should be a part of any chosen alternative.** It is also incumbent upon all federal agencies under Section 7(a)(1) of the ESA to do all in their power to foster the recovery of the endangered shortnose sturgeon. Providing passage opportunities to former spawning habitats and recovering valuable riverine habitats would certainly be positive actions for this species in the Savannah River.

2. Restore riverine and shoal habitat in the project vicinity.

Remaining Savannah river riverine Piedmont habitat is negligible. This is due to large and small reservoir developments throughout the Piedmont province. Particularly absent are important shoal habitats, the last vestige of which are the Augusta shoals upstream of the project. In that a portion of these shoals lie under the backwaters of the NSBL&D, restoration of this habitat should be an important consideration in any chosen alternative. Such restoration would also provide opportunities for recovery of native fish including the imperiled robust redhorse, restoration of associated forested wetland and riparian zones and reestablishment of the rare rocky shoals spider lily.

3. Maintain existing or replacement opportunities for recreational fishing in the vicinity of the project.

Currently, the NSBL&D area supports a sizable recreational fishery. While certain elements of this fishery may change with increased opportunities for fish passage, it is important for any chosen alternative to maintain or replace access and fishing opportunities in the vicinity of the project.

FUTURE OF FISH AND WILDLIFE RESOURCES WITHOUT THE PROJECT

The without project scenario is described in the Corps' 216 Study as the "status quo" alternative. Under this scenario the project would continue to operate "with minimal and inadequate routine maintenance and no future repairs and major rehabilitation unless stated as a safety issue." Under this scenario it is projected that the navigation lock would continue to be operated during

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the spring for passage of migratory species as long as it could be safely operated. The reliability and efficiency of this passage device, particularly for all migratory species, is questionable. There have been no documented passage of sturgeons through the lock. The percentage of shad stacking at the NSBL&D which are being passed upstream by the lock is unknown at this time. However, we estimate this percentage to be fairly low. The lock is designed for boat passage, not fish passage. To improve its effectiveness for fish passage, a side entrance closer to the dam and a crowder device to help fish exit would be needed.

The lock was closed for repairs for almost three years during 1996 through 1998. Although passage was effected through gate openings and release of upstream waters, such alternatives are limited by the availability of excess waters. During low water years, if the lock is non-operational supplemental passage would probably not occur. This would likely result in poor year classes of American shad in the Savannah system. A further problem in relying on upstream releases for passage is that limited opportunity for such passage occurs on a seasonal basis. Therefore, passage for early, mid and some late season spawners would not occur. Judging from the lack of maintenance and the current condition of the project described in the Corps' study, additional mechanical breakdown of the lock is anticipated.

While current non-passive passage alternatives employed at the project may continue to be available, these pose limitations of effectiveness for bottom oriented species. The lock's entrance location relative to the spillway reduces its passage efficiency. Facilitating passage using flow release and gate manipulation, are dependent upon available water and passage provided by this mechanism for sturgeons is unknown. Both mechanisms are non-passive and require physical manipulation at a given time to effect passage and only provide temporal "snapshot" type passage. For unimpeded passage for all species at all times a passive mechanism should be considered.

In the "future without the project" scenario, the continuing project impacts of impounding riverine habitat including a portion of the Augusta shoals would persist. Opportunities for restoration of cumulatively important impacted Piedmont and Sand Hills riverine habitat, forested wetlands and riparian zones, robust redhorse and rocky shoals spider lily populations would not occur.

CORPS' SELECTED PLAN AND ALTERNATIVES

1. Deauthorization and Dam Removal. As described in the draft study plan provided by the Corps to prepare this report, the recommended plan is Congressional deauthorization and dismantling of the project. The Corps has selected this as the recommended plan due to the absence of a local sponsor. The plan entails demolition by blasting with the resultant rubble placed along the streambanks to provide erosion protection. Project lands would be disposed as excess real property. This alternative would reduce the backwater effects of the project which currently extend to river mile 203 restoring about 15.7 miles of riverine habitats and provide unimpeded upstream and downstream passage to all migratory and riverine fish in the Savannah River.

2. Project Reauthorization With a Non-Federal Sponsor. This alternative addresses Congressional reauthorization based on a modified project authority which would include the purposes of fish passage enhancement, recreation and water supply. The Corps of Engineers would retain ownership and the sponsor would be responsible for a portion of the immediate capital repair costs and all future operations and maintenance costs. This alternative includes construction of a new fishway. The fishway alternative contained in the plan is a Corps design for a bypass channel pool and weir "gabion" fishway utilizing current project lands on the South Carolina side of the project.

3. Transfer Project Ownership. In this alternative, a non-Federal entity assumes ownership and is responsible for a portion of the immediate capital repair costs and all future operations and maintenance costs as well as all other responsibilities of the project. This alternative does not include construction of a new fishway facility.

COMPARISON OF IMPACTS OF ALTERNATIVE PLANS

1. No Action (Status Quo). As mentioned earlier, the no action alternative is projected to result in continued improper maintenance, and, in due course, an increased probability of structural failure. The impacts of this plan relative to fish and wildlife resources are spelled out in the Future Without the Project Section above. In summation, limited passage of some anadromous species upstream of the project would continue as long as the lock remains operational and the gates can be operated in high flow years to provide passage through the dam. Opportunities for passage of sturgeon and other bottom oriented species are particularly limiting. Opportunities for restoration of cumulatively important impacted Piedmont and Sand Hills riverine habitat, forested wetlands and riparian zones, robust redhorse and rocky shoals spider lily populations would be foregone until and unless the structure fails and no longer serves as a major hydraulic control.

2. Deauthorization and Dam Removal. Relative to fish and wildlife impacts, the dam decommissioning scenario offers positive impacts when compared to the "without project" (status quo) scenario. Positive impacts include enhanced passive fish passage which would yield ecological and population benefits for anadromous, catadromous and riverine species and foster the tenants of an interagency anadromous fish plan which calls for restoration of access to 35.7 miles of historic spawning habitats above the NSBL&D. It would also expand feeding, breeding and nursery area sites for native riverine species including the imperiled robust redhorse, who could pass the dam site at will. Opportunities to restore over 15 miles of riverine habitat including rocky shoals could be realized. Restoration of forested wetlands and riparian zones and populations of robust redhorse and rocky shoals spider lily could likewise be realized.

We anticipate several major riverine habitat types would be restored above the dam. In upstream reaches, rocky shoal habitat exemplified by the Augusta Shoals, would be restored. As the river traverses the fall line its morphology changes to a narrower, deeper section with lower sinuosity and sandy substrates as opposed to bedrock shoals. This description typifies the river through

the downtown Augusta area and the area of "Riverwalk". Based on observations during the demonstration "drawdown" of the river in January, 2000, riverine conditions would return above and below the fall line although rocky shoal restoration would be limited to the area above the fall line. The sandhills upper coastal plain section of the river between the fall line and the project would return to a classic sandhills river similar to the river below the New Savannah Bluff Lock and Dam. Sandy flats and point bars would be exposed. These would either be transitional features which would eventually flush downstream or relocate or longer term features which would quickly vegetate and stabilize. Several recent case studies of dam removal have demonstrated very rapid recovery of riverine sections from impounded reservoirs upon removal of the dam (American Rivers et al. 1999). From an ecological and aesthetic perspective, these areas have approached natural river recovery within just a few years. There is no reason to anticipate a different outcome above the New Savannah Bluff project. Indeed, because of high springtime flushing flows, relatively little sediment deposition and buildup has occurred (Stan Simpson, personal communication).

Existing uses which have manifested as a result of the "flat water" reservoir behind the dam, including industrial and municipal water withdrawals, waterfront developments including a marina and certain recreational uses would be affected by decommissioning and have to undergo certain transitions to a more riverine system. However, these incidental uses would also be affected by project failure which is portrayed as imminent under the without project alternative. Under the decommissioning alternative, industrial and municipal water intakes may have to be relocated or extended. Waterfront developments would go through an aesthetic transition from flat water, to riverine flowing water. Any temporary mud flat transition could be greatly temporally accelerated through flushing flows to move built up sediments downstream and riparian plantings to accelerate successional revegetation. In dam removal project reports across the country, rapid vegetation to an aesthetic state has occurred along sand and mud flats left above the former dam sites. Motor boat racing events would have to relocate to other open water locations. Recreational activities would transition from large motorized boats to canoeing, kayaking, rafting and small boat use. Recreational fishing (including fly fishing for American shad) could be promoted and help supplant, along with increased paddling use, any recreationally based economic losses to the area. Decommissioning the project with adequate planning efforts would allow for a smooth transition of incidental uses currently dependent on the impounded water behind the dam. Whereas, failure of the project due to insufficient maintenance under the no action alternative would result in potential severe, immediate and unplanned impacts to these uses.

3. Project Reauthorization With a Non-Federal Sponsor. Due to the inclusion of a fishway, this alternative offers some benefits to fish and wildlife resources over the no action alternative (depending upon fishway design). It does not result in any riverine habitat restoration although a small amount of habitat could be created within a natural bypass fishway depending upon the design of the fishway. Fishway design is critical to this alternative resulting in enhanced fish passage and beneficial effects to river defragmentation. As discussed below in Other Alternatives Which Should Be Explored section, the conceptual fishway currently proposed by the Corps is not acceptable to achieving the benefits of providing passage and habitat for the aquatic community in the project vicinity. While the hydraulic design may technically meet

passage criteria suggested by the Service, the pool and weir "rock gabion" fishway design falls far short of the "natural bypass" fishway concept recommended by the Service. Should this alternative move forward, we highly recommend that the previous Service recommendation of utilizing outside fishway engineering and design expertise be utilized to devise a more acceptable fishway concept.

In summary, this alternative would allow continued incidental uses associated with the flat water habitat above the dam, would not result in any significant riverine restoration, and could be beneficial to fish passage dependent upon the eventual design of an effective fishway.

4. Transfer Project Ownership. Since this alternative does not include construction of a fishway, it does not result in any benefits for fish and wildlife resources. It does not restore riverine habitat or guarantee any enhanced fish passage. Unless project transfer is crafted to include mandatory legal commitments of the new owners to manage the project to continue existing passage through the navigation lock and high water releases, this alternative may represent a worse scenario from a resource perspective than any of the others including the no action alternative.

OTHER ALTERNATIVES WHICH SHOULD BE EXPLORED

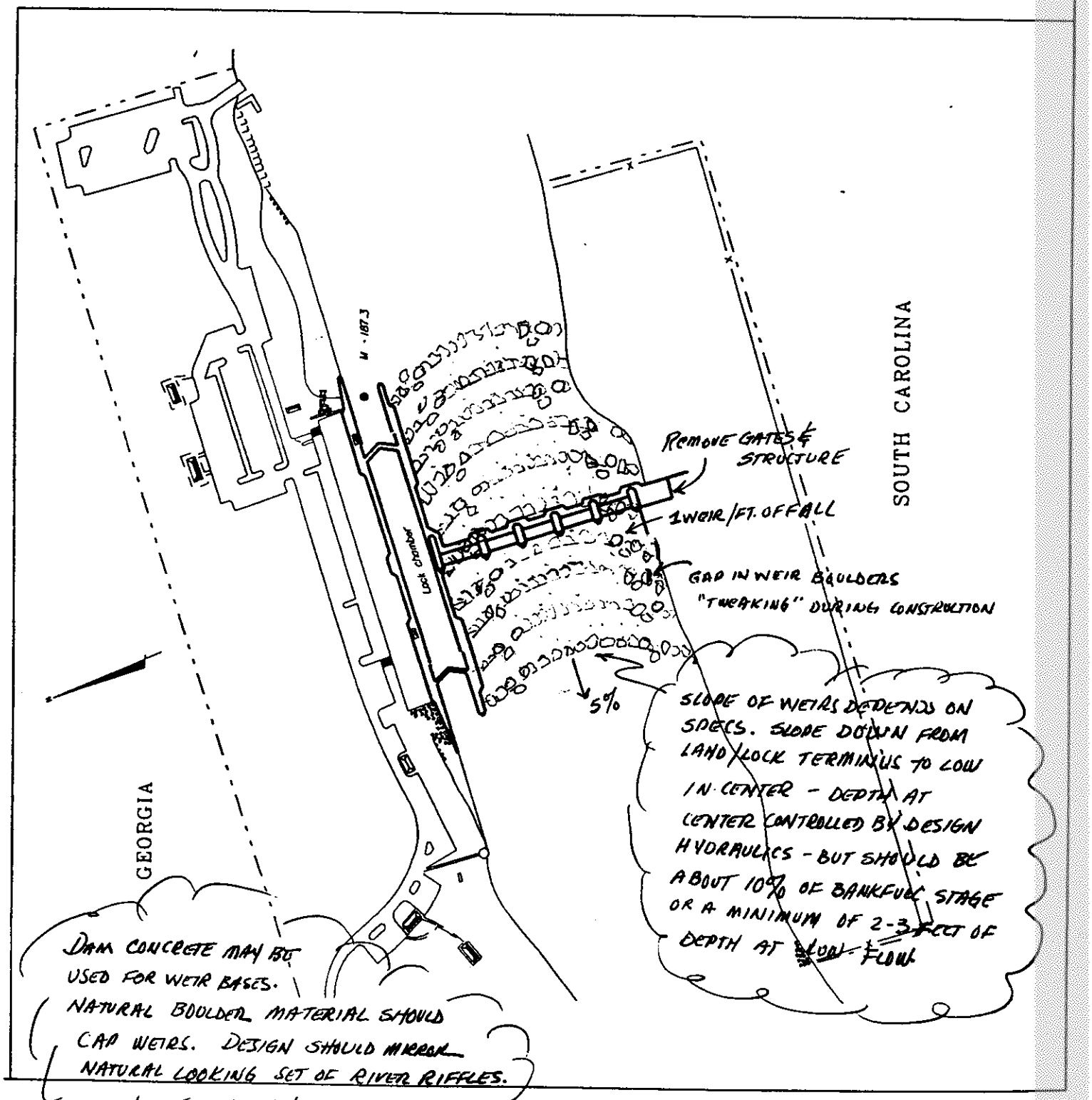
The eventual resolution and fate of the New Savannah Bluff Lock and Dam is a recognizably difficult decision in that it involves a complex myriad of seemingly competing interests. Dam removal and decommissioning would best benefit fish and wildlife restoration considerations by restoring slightly over 20 miles of riverine habitat, including several miles of critically and cumulatively important bedrock shoal habitat and defragmenting the river restoring physical, chemical and biological transport processes including unimpeded movements of the aquatic community. However, existing uses would be required to adapt from the existing flat water condition requiring shifts in recreational uses and adjustment of water intakes. While because of the overwhelming benefits to fish and wildlife resources, the Service considers the dam removal alternative the best, if this alternative is not chosen in light of other considerations, we believe that there are other alternatives which should be explored that represent a better balancing of biological and natural resources with sustaining existing uses. These include a new alternative which replaces the dam with a more natural looking and functioning set of rock weirs (see figure 7) and variations of existing alternatives.

1. Rock Weir Alternative. Under this scenario, the dam would be removed and replaced by a series of upstream facing "U"-shaped rock and boulder weirs. Weir elevation would taper towards the upstream center of the "U" forming a center channel in the river which would serve as a passage mechanism for aquatic organisms (see figure 7). The number of weirs depends upon the head which needs to be maintained in the pool above the weirs (one weir for each foot of head). We would recommend that a ten foot head be targeted. This would allow upstream restoration of some shoal habitat by eliminating some backwater effects. This alternative could allow the existing navigation lock to remain to service passage of larger vessels and allow a pool to be maintained above the project while restoring some shoal habitat and allowing essentially unimpeded passage of migratory and riverine fish including difficult to pass bottom oriented

Figure 7.

CONCEPTUAL ROCK WEIR ALTERNATIVE - NEW SAVANNAH BLUFF LOCK & DAM

(BASED ON SKETCH BY LUTHER AADLUND)



species such as sturgeon. Aesthetically, the weirs could be designed to resemble a natural looking shoal feature. Although, rock shoals are not natural in this location, they would be a significant improvement in natural aesthetics compared to the existing dam.

Earlier suggestion of this alternative by the Service was dismissed by the Corps under the rationale that it provided less flood protection than the dam restoration alternatives. Since flood protection is not, and has never been a project purpose and that high discharge events would overwhelm the hydraulic control features of the proposed structure such that it does not significantly affect upstream flooding, we remain convinced that this would be a worthwhile "win-win" alternative to be further explored. This alternative may also offer cost savings when considering the long-term maintenance of the existing lock and dam structure. Alternatively, utilizing a similar concept, an in-river rock weir fishway ramp, similar to the design being implemented by the Wilmington District on the Cape Fear River, North Carolina, may be worthy of consideration.

2. Modification of the Dam Decommissioning and Removal Alternative. This alternative should be re-evaluated relative to the determination that it is not economically feasible. The re-evaluation should consider that this alternative results in retiring an antiquated structure and project purpose, negation of expensive restoration costs and elimination of taxpayer financed future operations and maintenance costs in perpetuity. It also includes economic benefits of ecological restoration and enhanced fisheries stocks. We note that the cost/benefit ratios do not include the non-market value of restoring 20 miles of riverine habitat. Even if the resultant cost/benefit ratio is less than one, this should not be interpreted to mean the alternative is not "economically feasible". Section 907 of the Water Resources Development Act of 1986 states that the benefits of environmental measures are to be deemed equal to their cost.

Additional sub-alternative modifications should include:

- Cost reduction modifications (e.g., leaving concrete rubble in place as long as it is not a navigation hazard or fish migration barrier).

- Subsequent studies and identified remedial actions for riverine and riparian habitat restoration (e.g., sediment flushing flows, riparian plantings) above the dam.

- Subsequent studies and actions which would foster the continued high use recreational bank fishery. These should include a replacement bank angler access facility for the outer lock wall and mitigation of any lost angling opportunities through construction of fish attraction sites and improved bank angler access.

- Seeking Congressional funding or other innovative funding or financial incentives and partnerships to aid transitions for industrial, commercial and private interests which may be economically affected by project decommissioning. These monies should be obtained prior to or in conjunction with decommissioning to help mitigate incidental economic burdens due to the decommissioning.

3. Modifications to the Project Reauthorization With a Non-Federal Sponsor Alternative. This alternative should be modified to change the currently proposed fishway design. It should explore development of alternative fishway designs in consultation with the Service and other resource agencies utilizing outside expertise in fishway design and engineering. There are qualified entities which the Corps can utilize to achieve alternative designs which would pass fish utilizing a natural channel instead of a highly engineered structure. It may or may not be possible to reach the desired design within the boundaries of the land currently owned by the Corps. However, if additional lands on the South Carolina side of the project are required, the reduction in costs associated with the more natural channel design should more than offset land acquisition costs. Additional lands would also facilitate development of more public access for recreational and educational purposes expanding the public interest benefits of the fishway.

Even with a natural bypass fishway, we anticipate a reduction in fish passage potential in comparison to the dam removal or rock weir alternatives. Therefore, we recommend that the new fishway be coupled with lock alterations to further enhance fish passage such that the lock may serve as an effective supplemental passage structure. During its rehabilitation, the lock structure can be modified to include a slotted side entrance closer to the dam and incorporate a crowder device to help fish exit the lock. This should greatly enhance the efficiency of the lock for fish passage. A Service fishway engineer is currently working on a design of lock modifications for these purposes.

4. Modifications to the Transfer Project Ownership Alternative. This alternative should be modified to require enhancement of fish passage as a requisite element of the transfer. The same alternatives discussed above for the Project Reauthorization (new bypass fishway design and modified lock design) should be considered. A Federal project and Federal land transfer carry with it certain public trust responsibilities. It is incumbent to fulfill these responsibilities as well as to satisfy Section 7 (a)(1) of the Endangered Species Act relative to shortnose sturgeon, that the Corps require the level of environmental enhancement which would occur would the project stay in Federal hands.

CUMULATIVE IMPACTS

The Savannah River has been fragmented by a series of dams. Historically, anadromous fish traveled 384 miles from the ocean to the limits of their historic spawning habitat in the headwaters. If we assume that suitable spawning habitat begins at the saltwater/ freshwater interface (roughly RM 20), approximately 364 miles of spawning habitat was available. After 1846, the Augusta Diversion Dam acted as a barrier to the further ascent of anadromous species. In 1883 a fishway was constructed in this dam because of complaints by residents above Augusta about the injurious effect of the dam on the shad fishery (however this fishway was never effective at passing fish). Completion of the NSBL&D project in 1937 at what is now RM 187.3 restricted migrations beyond that point, further reducing available spawning and nursery habitat for anadromous fishes utilizing the Savannah River. Historic spawning habitat in the Savannah has been essentially cut in half. More significantly, the best available spawning habitat for

some species (striped bass and sturgeons) may have been above RM 170 (bedrock, shoal, gravel bed) or so in the pre-dam condition. So for some species the available habitat may have been cut to less than 10 percent. The NSBL&D project has cumulatively added to the loss of access to remaining suitable spawning habitat. While some passage has been effected both naturally and artificially, its relative effectiveness is generally unknown but considered low.

Essentially all of the Piedmont riverine habitat in the Savannah River has been lost through dam construction. Historically, approximately 180 miles of the Savannah river flowed through the Piedmont Province. A small section of Piedmont riverine habitat, approximately 4 miles, remains below the Augusta Diversion Dam. However, the quality of habitat in this section is affected by controlled flow releases from upstream dams and diversions into the Augusta Canal. Some riverine-like habitat exists between Strom Thurmond Dam and the Stevens Creek dam. This has been judged to be suitable for anadromous fish spawning and recruitment if low oxygen hypolimnetic releases from the Strom Thurmond Dam are improved.

Under the status quo alternative the NSBL&D project would continue to contribute to the cumulative impacts to anadromous fish and riverine habitat in the Savannah River. The decommissioning and dam removal alternative would provide for restoration of over 15 miles of riverine habitat, of which a portion is in the Piedmont province thereby somewhat ameliorating the cumulative Piedmont riverine habitat loss experienced in the Savannah River. It would also be the first step in restoring passage to the base of the Strom Thurmond Dam which is in accord with the interagency anadromous fish plan for the Savannah. While passage beyond the Strom Thurmond Dam would accomplish little because of the lack of riverine habitats, passage to the base of the dam at RM 223 would restore access to 35.7 miles of historic spawning habitat, an increase of over 21 percent over what currently exists thereby reducing the cumulative loss of historic anadromous fish habitat. The significance of this 21 per cent increase is notable in that the quality of habitat accessed may be considerably higher than the downriver habitats.

Depending upon the fishway design, by effectively passing anadromous species into portions of historical spawning habitats, the reauthorization alternative would alleviate some of the cumulative loss of anadromous fish spawning habitat. An effective fishway would also contribute to reducing the cumulative river fragmentation impact of the existing project. However, there would be no opportunity for restoration of riverine habitat, particularly Piedmont riverine habitat, which represents a significant cumulatively lost resource in the Savannah River system. Depending upon whether a fishway is incorporated into the project transfer alternative, the effects of this alternative on cumulative impacts would be similar to the reauthorization alternative. If no fishway is incorporated, the transfer alternative would do nothing to alleviate cumulative impacts on aquatic habitats in the mid-Savannah River.

By providing unimpeded fish passage and an opportunity to restore some backwatered shoal habitats (if a target head elevation of ten feet is selected), the rock weir alternative would alleviate existing cumulative impacts of fragmentation and fish migration and, to a small extent, effect some riverine restoration.

PROJECT ECONOMICS AND SELECTION OF THE NED ALTERNATIVE

In the last draft of the Corps' 216 Report we received (dated August 31, 2000), additional economic analyses has been performed towards designation of the National Economic Development (NED) plan. The "transfer" alternative was so designated. In evaluating the results presented, it is important to note the following:

1. The economic benefits which would ensue from additional riverine recreation opportunities accompanying the decommissioning alternative are not included to offset the losses projected for this alternative. We envision increased opportunities for riverine fishing, kayaking, canoeing and rafting.

2. The main driver of the positive economic benefits from the transfer and reauthorization alternatives in comparison to the decommissioning alternative is the speculative increase in recreational benefits from the potential private entrepreneurial operation of a riverboat through the navigation lock. Basing project decisions and the national economic development on this speculative private entrepreneurial future endeavor is questionable to say the least.

3. The main difference in the economics between the transfer and reauthorization alternatives is that the cost of a fishway is not included in the transfer alternative. As stated repeatedly in this FWCA report, it is the opinion of the resource agencies that inclusion of a fishway is imperative for any selected alternative. We fail to see how a chosen NED alternative can fail to include a fishway which is critical to the life cycles of nationally important species.

4. The fishway cost estimate of $5.5 million is based on a Corps' design which is currently unacceptable to the resource agencies. Based on construction of other fishways closer to our design concept, we believe that the $5.5 million figure is inordinately high.

RECOMMENDATIONS

Based on the projected impacts of the project alternatives as discussed above and considering the ability of the various alternatives to meet resource planning objectives (see Table 2), the Service recommends the following actions/alternatives to reduce and eliminate the continuing impact of the NSBL& D project on fish and wildlife resources and provide for a clearer decision making process. **In order to meet the primary resource objective of reversing river fragmentation, it is important that restored or enhanced passive passage opportunities for all migratory species should be a part of any chosen alternative.**

Recommendation 1. Select the dam decommissioning alternative which includes removal of the dam structure to the extent that it no longer serves as a blockage to fish movement but also develop sub-alternatives which include:

- Subsequent studies and identified remedial actions for riverine and riparian habitat restoration (e.g., sediment flushing flows, riparian plantings) above the dam.

- Subsequent studies and actions which would foster the continued high use recreational bank fishery. These should include a replacement bank angler access facility for the outer lock wall and mitigation of any lost angling opportunities through construction of fish attraction sites and improved bank angler access.

- Seeking Congressional funding or other innovative funding or financial incentives and partnerships to aid transitions for industrial, commercial and private interests which may be economically affected by project decommissioning. These monies should be obtained prior to or in conjunction with decommissioning to help mitigate incidental economic burdens due to the decommissioning.

Recommendation 2. If the dam decommissioning and removal alternative is not selected or its selection is later supplanted by Congressional action or other factors, serious exploration of other alternatives suggested in this report should be undertaken. These include the instream rock weir alternative, modifications of the currently proposed fishway design and inclusion of a fishway in the transfer alternative.

Recommendation 3. For any selected alternative other than the dam decommissioning and removal or instream rock weir alternatives , design and construct a passive fishway alternative which would provide unimpeded passage for all aquatic organisms in this area of the Savannah River. Such fishway should ideally be based on a natural bypass channel fishway design which incorporates construction of a morphologically natural stream segment around the dam site. The constructed stream should be designed to dissipate energy and provide suitable fish passage velocities by mimicking geomorphically natural features such as meander bends, and pool/riffle complexes. It should be noted that the SCDNR recommends a South Carolina side alternative with an educational facility and bank and boat angler access. Based on review of the site, it appears that if the navigation lock remains functional, a South Carolina side fishway may be the only effective location to attract fish into the fishway.

Table 2

COMPARISON OF ALTERNATIVES RELATIVE TO MEETING RESOURCE PLANNING OBJECTIVES

ALTERNATIVE	RESOURCE PLANNING OBJECTIVE		
	Unimpeded Passage	**River Restoration**	**Maintaining Recreational Fishing Opportunities***
No Action	0	0	1
Decommissioning/Removal	3	3	1
Reauthorize	1 - 2**	0	1
Transfer - As Currently Proposed	0	0	1
Transfer - With Fishway Required	1 - 2**	0	1
Rock Shoal Weirs	3	1	1

Scoring Legend

0 = Fails to meet resource planning objective
1 = Neutral or slight improvement in meeting resource planning objective
2 = Partially meets (modest enhancement) resource planning objective
3 = Resource objective fully met

* All alternatives are considered equal relative to maintaining recreational fishing opportunities. While opportunities may change in location and method, there should be no net change in overall recreational fishing opportunities particularly if Service recommendations calling for mitigation of existing access losses are incorporated into alternatives.

** Depending on the fishway design and alternative(s) chosen.

Recommendation 4. For any selected alternative other than the dam decommissioning and removal or instream rock weir alternatives, include fish passage enhancements in the lock rehabilitation plans. These consist of a new side entrance slot close to the dam and a crowder device to help fish exit the lock chamber.

Recommendation 5. Provide additional studies on project economics which include the positive benefits of dam decommissioning to anadromous fish stocks and consequently long term recreational and potential commercial fishing benefits, river and shoal habitat restoration and restoration of native fisheries and unique plants such as the robust redhorse and rocky shoals spider lily. Such information will require economic studies utilizing contingent valuation methods. The inclusion of such information will better balance the economics of the decommissioning alternative to which the study currently attributes no economic benefits.

Recommendation 6. Provide studies and simulations demonstrating the anticipated post-sediment flushed river channel morphology above the NSBL&D. While we anticipate the return of aesthetic riverine conditions for the current backwater area, the modeling and simulation of these conditions should provide a higher degree of aesthetic comfort level to those interests concerned with this element of the project.

POSITION OF THE U.S. FISH AND WILDLIFE SERVICE

The NSBL&D is the lowest dam and hence the first blockage to migratory species on the Savannah River where approximately half of historic spawning habitat has been lost. Its sole Congressionally authorized purpose of commercial navigation has long ceased to be valid. The project works are in a poor state of repair and would require significant federal dollars to repair and maintain in a safe condition. Decommissioning the project would provide the opportunity for provision of unrestricted fish passage and restoration of important riverine habitats including rocky shoal habitat which is relatively rare in the Piedmont section of the Savannah River due to a series of large and small reservoirs which occupy almost all Piedmont segments of the Savannah. Current users of the impounded section above the NSBL&D would have to make adjustments and/or transition to other uses. If Congressional funding could be sought to facilitate this transition, the one-time expenditures may represent a savings over long-term maintenance of a facility which has outlived its original intent.

If dam decommissioning and removal proves to be a "politically unacceptable" solution, there are other alternatives which should be explored. While these would not significantly restore riverine habitats, they would considerably enhance fish passage and thereby somewhat alleviate the ecological fragmentation affects of the project. These alternatives include replacing the dam with an instream rock weir complex, and for any dam restoration alternatives, including effective fish passage designs into a natural bypass channel on the South Carolina side and modifications of the navigation lock to enhance fish passage. Design of these fishways should be done in coordination with the resource agencies utilizing specialized fishway engineering and design expertise.

Any chosen alternative should maximize ecological defragmentation, enhance fish passage, attempt to restore cumulatively impacted riverine habitats (especially Piedmont shoal habitat) and maintain and enhance recreational fishing opportunities.

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APPENDIX A

Comment Letters from sister FWCA agencies - National Marine Fisheries Service, South Carolina Department of Natural Resources and Georgia Department of Natural Resources

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, Florida 33702-2432

September 1, 2000

Mr. Roger Banks
Field Supervisor
U.S. Fish and Wildlife Service
Suite 200
176 Croghan Spur Road
Charleston, South Carolina 29422-2559

Dear Mr. Banks:

The National Marine Fisheries Service (NMFS) has reviewed the U.S. Fish and Wildlife Service's (FWS) August 15, 2000, Final Fish and Wildlife Coordination Act Report on the New Savannah Bluff Lock and Dam Section 216 Decommissioning Study. This addresses the FWS report and is provided in partial fulfillment of our requirement under the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) to provide comments and recommendations pertaining to fishery resource conservation.

The report provides a thorough and accurate description of aquatic resources for which the NMFS has stewardship responsibility. We concur with your determination that dam decommissioning and remedial actions that would enhance fish passage are needed. The NMFS also agrees with your determination that failure to decommission the dam would perpetuate obstruction of diadromous fish migrations and recovery of aquatic resources that are regional, national, and international importance.

The NMFS, through its responsibility under the Fish and Wildlife Coordination Act, requests that the recommendations contained in your report be forwarded to the U.S. Army Corps of Engineers as joint recommendations of the FWS and the NMFS.

We appreciate the opportunity to provide these comments. Mr. David Rackley of our Charleston Area Office is available in the event that further assistance is needed. He may be reached at 219 Fort Johnson Road, Charleston, South Carolina 29412-9110, or at (843) 762-8574.

Sincerely,

for David H. Rackley

Andreas Mager, Jr.
Assistant Regional Administrator
Habitat Conservation Division

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, Florida 33702-2432

September 1, 2000

Colonel Joseph K. Schmitt
District Engineer, Savannah District
Department of the Army, Corps of Engineers
P.O. Box 889
Savannah, Georgia 31402-0889

Dear Colonel Schmitt:

The National Marine Fisheries Service (NMFS) has reviewed the U.S. Fish and Wildlife Service's (FWS) August 15, 2000, Final Fish and Wildlife Coordination Act Report on the New Savannah Bluff Lock and Dam Section 216 Decommissioning Study. This addresses the FWS report and is provided in partial fulfillment of our requirement under the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) to provide comments and recommendations pertaining to fishery resource conservation.

The subject decommissioning study offers an unprecedented opportunity to restore diadromous fish migrations and to contribute to recovery of aquatic resources that are regional, national, and international importance. These resources are described in detail in the FWS report. We concur with the FWS determination that dam decommissioning and remedial actions that would enhance fish passage represents the most environmentally sound and prudent alternative. However, in the event that decommissioning is not selected as the final alternative, then effective fish passage should be made an integral part of any dam rehabilitation alternative.

As mentioned in the FWS report, there are other alternatives that warrant further consideration. These include replacing the dam with a rock weir complex, construction of a fish passage bypass channel, and modification of the navigation lock to enhance fish passage. Further evaluation of these alternatives should be performed in consultation with state and federal resource agencies and, in this regard, we note that both the NMFS and FWS may be able to provide specialized fishway engineering expertise.

Finally, based on discussion with our Protected Resources Division, we understand that they will be providing comments regarding federally listed threatened or endangered species for which the NMFS has responsibility. Matters related to those species should be directed to the attention of Mr. Charles Oravetz at our Protected Resources Division at the letterhead address, or at (727) 570-5312.

We appreciate the opportunity to participate with your staff in development of ecologically and environmentally sound solutions regarding the future of the New Savannah Bluff Lock and Dam Project, and the Savannah River Basin's diverse water, recreational, and fishery resources. Please

direct related questions or comments to the attention of Mr. David Rackley at our Charleston Area Office. He may be reached at 219 Fort Johnson Road, Charleston, South Carolina 29412-9110, or at (843) 762-8574.

Sincerely,

David H. Rackley

for Andreas Mager, Jr.
Assistant Regional Administrator
Habitat Conservation Division

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, FL 33702
(727) 570-5312; FAX 570-5517

AUG 25 2000

F/SER3:JLL

Mr. M. J. Yuschishin
Chief, Planning Division
Savannah District
U.S. Army Corps of Engineers
P.O. Box 889
Savannah, Georgia 31402-0889

Dear Mr. Yuschishin:

This is in response to Mr. William G. Bailey's August 16, 2000, request via email that the National Marine Fisheries Service (NMFS) provide comments on the most recent draft available (August 16, 2000) of the Section 216 Disposition Report for the New Savannah Bluff Lock and Dam (NSBLD) and its potential impacts to endangered species under NMFS purview to assist in its preparation of the final document. NMFS previously provided endangered species comments on the December 1999 draft report and Environmental Assessment for this project on January 27, 2000, supporting the proposed alternative of deauthorizing and decommissioning the NSBLD.

The endangered shortnose sturgeon (*Acipenser brevirostrum*) and Federal candidate species Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) occur in the Savannah River and have been caught at the base of the NSBLD. The NSBLD has adversely affected both species of sturgeon for over sixty years by blocking their access to prime spawning and rearing habitat. Current fish passage practices at NSBLD likely provide no benefit to either species.

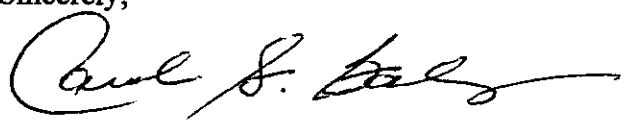
As stated in our December letter, we believe that the NSBLD project offers a significant opportunity for interagency sturgeon recovery actions in the Southeast. NMFS continues to support the deauthorizing and decommissioning of the NSBLD and is pleased to see that it remains the selected alternative. The draft report states that without a non-federal entity to transfer ownership or to sponsor reauthorization of this project the District has no other option but to recommend complete removal and deauthorization of this project. NMFS recommends the deauthorizing and decommissioning of the NSBLD, regardless of whether a local sponsor steps forward or not. The selected alternative would provide valuable beneficial effects for the endangered shortnose sturgeon, as well as for the Atlantic sturgeon, by restoring approximately 16 miles of riverine habitats and by providing unimpeded upstream and downstream passage to all migratory and riverine fish in the Savannah River.

The two other alternatives presented in the disposition report, project reauthorization with a non-federal sponsor or the transfer of ownership, would continue to adversely affect shortnose sturgeon and Atlantic sturgeon in the Savannah River unless they are revised to each incorporate a fish passage solution that would be effective for all sturgeon life stages. The conceptual fishway currently proposed by the Corps is not acceptable to achieving this goal and the current alternative to transfer ownership does not include fish passage for sturgeon at all. NMFS reminds the Corps of its obligation under Section 7(a)(1) of the Endangered Species Act to foster the recovery of the endangered shortnose sturgeon, as well the limitation on commitment of resources under Section 7(d). If the dam decommissioning and removal alternative is not selected or its selection is later supplanted by congressional action or other factors, serious exploration of other alternatives, such as those suggested in the U.S. Fish and Wildlife Coordination Act Report, must be undertaken. These include the instream rock weir alternative, modifications of the currently proposed fishway design and inclusion of a fishway in the transfer alternative. Fish passage suitable for sturgeon needs to be implemented prior to any transfer of ownership, or at least included as a condition of its sale.

Based on selection of the preferred alternative, NMFS does not believe this project is likely to adversely affect endangered shortnose sturgeon. Should the selected alternative change or an alternate plan be selected, reinitiation of consultation will be necessary.

Thank you for the opportunity to review and comment on the draft version of the final disposition report. Please contact Jennifer Lee of the Protected Resources Division for any future coordination efforts, further consultation, or if you have specific questions about our comments.

Sincerely,



Carol S. Ballew
Acting Regional Administrator

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South Carolina Department of
Natural Resources

Paul A. Sandifer, Ph.D.
Director
John V. Miglarese
Deputy Director for
Marine Resources

September 12, 2000

Mr. Steve S. Gilbert
U.S. Fish and Wildlife Service
176 Croghan Spur Road, Suite 200
Charleston, SC 29407

Re: Fish and Wildlife Coordination Act Report on the New Savannah Bluff Lock and Dam 216 Decommissioning Study

Dear Mr. Gilbert:

The South Carolina Department of Natural Resources (SCDNR) has received the Fish and Wildlife Coordination Act (FWCA) Report regarding the New Savannah Bluff Lock and Dam (NSBL&D) Project Section 216 Disposition Study dated August 15, 2000. We welcome the opportunity to review this document and provide comments.

The SCDNR agrees that the NSBL&D currently poses environmental impacts to the fish and wildlife resources surrounding the project. Of primary concern is blocking of anadromous fish passage to upstream spawning grounds. Anadromous fish species affected by the dam include American shad, hickory shad, blueback herring, striped bass, shortnose sturgeon and Atlantic sturgeon. Other concerns include effects on populations of robust redhorse and rocky shoal spider lilies, rare fish and plant species. We find discussion in the FWCA Report related to these impacts to be accurate.

The SCDNR concurs with the findings and recommendations of the FWCA Report. We believe decommissioning of the NSBL&D is an excellent opportunity to enhance anadromous fish populations and to restore approximately 15 miles of riverine habitat in the Savannah River. Specifically, we agree the alternative to transfer project ownership should include mandatory conditions for enhancing anadromous fish passage as part of that transfer. We also recommend that whatever alternative is selected, it should accommodate navigation for recreational boats of appropriate sizes for the Savannah River under natural conditions.

Thank you for the opportunity to review this document. SCDNR looks forward to being an active participant in future activities regarding the disposition of NSBL&D.

Sincerely,

Robert E. Duncan
Environmental Programs Director

cc: Col. Joseph Schmitt - Savannah District, USACE